

Adoption of Planting Corn Harvesting Cattle Program in North Central Timor Regency

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The Planting Corn Harvesting Cattle Program (Program Tanam Jagung Panen Sapi - TJPS) is a local government initiative in East Nusa Tenggara Province, North Central Timor Regency, aimed at increasing corn harvest area, production, and productivity to support national food security. This study analyzes the implementation of the TJPS program, key influencing factors, and farmer adoption levels in Insana District. A quantitative descriptive method was used through surveys and structured interviews. The findings show that internal factors such as age, education, farming experience, and external factors like land size and productivity are generally adequate. Respondents had an average age of 49.77 years, 64% with low formal education, and 94% with minimal non-formal education. Farming experience averaged 17.72 years, with 56% managing small farms (<0.65 ha) and 78% having low productivity (1-1.9 tons/ha). The adoption level of TJPS technology is mostly in the early majority category (39.2%), with 15.2% as early adopters and 6.3% as innovators. While the program has been widely adopted, further improvements in farmer participation and technology use are needed.

Keywords: Agricultural policy, food security, technology adoption, productivity, sustainability.

INTRODUCTION

In Indonesia, the value of cooking oil has been noted to differ across its consumer and wholesale markets. Such price variability can be explained by several forces that influence the determinants of this market, including, and more importantly, weather, various outputs, and productivity levels. In fact, the latter terms are crucial because they refer directly to the research area – palm oil and/or cooking oil output in that country. Indonesia is also one of the main producers of palm oil in the world, yet the local market is characterized by a lot of price inconsistencies. Even though Indonesia widely grow palm oil Oak palm trees versus cost-effective brands' expectation, the wholesale markets display significant price differences as well. Such infatuation licensed mass-brand manufacturers to easily enter palm agribusiness. In the current context, the rise in population and food and feed industry expansion means that for food, feedstuffs, and industrial products, there is growing demand to supply them (Guyomard *et al.*, 2013; Makkar, 2018; Nkukwana, 2018; Sandström *et al.*, 2022). Every year this demand-tree extends a couple of new leaves. Corn is treated as a strategic

commodity given its importance in national food security. As an answer to these challenges, the Ministry of Agriculture has been resolute in increasing corn yields in various ways. One such approach is the "Planting Corn, Harvesting Cattle" (TJPS) program, which has been introduced in particular in East Nusa Tenggara Province. This program aims to increase food production, primarily of corn, using various methods, including the expansion of planting area, the Integrated Plant Management Movement, and the provision of seeds, fertilizers, pesticides, tools, and antidotes against pests. Its implementation requires fitting to local conditions, especially in North Central Timor Regency. There, different social, economic, and environmental conditions have created their own customs of agriculture. The TJPS program in this district was initiated three years ago. With facilitators and extension workers added by the Agriculture Office, the initiative has been adjusted to the special potential of each farmer's land and has fostered innovative new designs (Hellin, 2012; Singh and Burman, 2019). A program communication system is essentially human, taking account of the human resources conditions prevailing here and the availability of farm-site facilities and infrastructure. Data from the North Central

Timor Agriculture and Forestry Office (2021) show that annual production targets set for the year showed significantly lower levels even as actual yields ratcheted upward—26,462 tons in 2015; 29,665 tons in 2016; 18,863 tons in 2017; 59,465 tons in 2018; and 62,348 tons in 2019—creating a fluctuating but overall upward progression of production that now stands at an average productivity rate of 2.76 tons per hectare. Even so, productivity levels remain well below national averages, indicating the persistence of problems in achieving corn production self-sufficiency. However, despite all its work, these anticipated benefits in terms of income generation and food security from corn production have not mainly been realized in fact. The failures in corn production and productivity in North Central Timor can be ascribed to several factors. Foremost, traditional farming habits persisted, and under the TJPS program's support, farming technology was not applied intensively enough—they were among the main obstacles to any improvement in productivity. Another stumbling block is the disappearance of traditional knowledge, which ordinarily takes farmers to be simple survivors who simply eat what they grow. In addition, ongoing drought conditions, the difficulty of acquiring satisfactory seeds and fertilizers, plant diseases multiplying uncontrolled, there being few laborers, slow dissemination of technical progress, high transport charges, market inaccessibility, and strict restrictions upon the supply of cash and information prevent increasing corn yields overall. All these constraints serve to limit the area available for planting corn. The aggregate effect of these challenges is, however, to make North Central Timor an area where corn is seldom grown even if production and productivity decline.

Although numerous studies have investigated what discourages farmers from adopting new techniques, including technological, social, and economic factors, it still remains as yet unclear how specifically the TJPS program is adopted in North Central Timor Village's fishery under the local wisdom of that area and what farmers' economic characteristics are like. Many earlier studies are primarily concerned with techniques and mechanical tools for raising productivity, ignoring any one person's sense of what he is and life goals it may have made due course. As a result, although obstacles such as limitations of infrastructure and the absence of funds have been recognized as barring the way to higher agricultural productivity on one side or another, little academic research addresses the relationship between government policy, local traditions, and on-farm adoption of the sustainability of innovation (Ingram, 2015; Šūmane *et al.*, 2018; Dyck and Silvestre, 2018; Rosário *et al.*, 2022).

The positive effect of interpersonal communications between extension workers and farmers in causing the adoption of technologies has also not received enough attention, despite the fact that effective communication is crucial for marketing plan success, for example (Cheboi, 2014; Jansen *et al.*, 2010). Given this, the study not only describes the technical adoption

of the TJPS program; it argues also that readjustments in farmers' characteristics, circle knowledge, and mode of communication are needed if we are earnestly to implement this program. This research aims to provide a more complete understanding of the conditions that can make it possible for the TJPS initiative to endure indefinitely. These are socially and culturally-based obstacles in contrast with past experience which generally only recognizes economic or technological barriers. Additionally, a field survey on how people in WEIs play the game for windows revealed that the agencies do not always those left out. If such policies are not put into effect, they will drive only disaster towards Earth! Making use of extension services at a time when farming itself has become decentralized brings fresh insights into how agricultural outreach should proceed in areas where traditional levels of farming predominate. But given these considerations, an investigation is urgent concerning the grassroots adoption of the "Planting Corn Harvesting Cattle" (TJPS) program in North Central Timor Regency. This further study aims to delve into certain problems found in our previous work, by considering the often-neglected aspects of embodying local wisdom and ways communication takes place, while also improving the sustainable production of corn crops within this county.

MATERIALS AND METHODS

In this research, the research objectives are investigated by adopting a descriptive-quantitative approach. Slovin's formula is a commonly used method to determine the appropriate sample size from a known population, especially when detailed information about the population's characteristics is limited. This formula helps calculate the minimum number of respondents required to represent the entire population within a specified margin of error. The Slovin's formula is expressed as:

$$n = \frac{N}{1 + N \times e^2}$$

Where: N = required sample size; n = total population size; E = margin of error (acceptable error tolerance)

Typically, the margin of error (e) is set at 5% (0.05) for a confidence level of 95%. In this study, the population consisted of 270 individuals, and with a margin of error of 5%, the calculated sample size was 161 respondents. This calculation ensures that the data collected from the sample accurately represents the overall characteristics of the population.



Table 1. Number of Respondents for Each Farmer Group in Insana Subdistrict Based on Slovin's Formula.

Village	No. of groups	Farmer group name	Population	Sample size
Oinbit	9	KT. Moinfuli	28	17
		KT. Bijaesunan	21	12
		KT. Moinmuni	24	14
Fatoin	5	KT. Cahaya Sap'an	25	16
		KWT. Ataubaale	24	14
		Nunusili		
Manunain A	6	KWT. Nespol	24	14
		KWT. Oenikis	26	16
Manunain B	5	KT. Fatusene	29	17
		KT. Konifa	25	15
Nunmafo	4	KT. Hanmau	24	14
Bitauini	3	KT. Polo	20	12
Total			270	161

Our respondents were chosen through Simple Random Sampling, using the Slovin Formula as a guide, giving us a total of 161 participants. We carried out the fieldwork to collect primary data from October to December 2021, using structured interviews with a questionnaire format that had been developed beforehand. These in-depth interviews comprising an Insana District NCT-NTT Regency took place within the farmer groups. Additionally, we got information from local representatives such as agricultural extension officers, Babinsa (village military personnel), and traditional leaders or village heads in Insana apart from talking with members within those farmer groups. The questionnaire used in this study is based on existing literature, expert consultations, and pre-survey observations to ensure it has relevance to the research objectives. The questionnaire was divided into several sections, encompassing:

Demographic information:

Agriculture and farmers' perceptions of the TJPS program, adoption of agricultural innovations, and local tradition.

The effectiveness of extension communication: The questions, for the most part, were directed towards mothers as this would have been related to one issue. However, throughout most of them, they posed a question ago with Likert scales ranging from 1 to 5. This helped reflect how groups towards certain questions also tended towards how many other responses correspondingly returned the same response. Before formally setting out to collect data, a pilot study was held with 20 farmers from outside of our research object area in order to examine the clarity of the questionnaire, the reliability of which we have already stated was incomplete, prior to that also finding that it had several elements in need of valid symbols. The reliability test was conducted by using Cronbach's Alpha to ensure the internal consistency of the questionnaire, and the validity test relied on Pearson's correlation to validate the construction of questionnaire items. Secondary sources were collected from data recorded at the Badan Pusat Statistik (BPS) and related

organizations. The analysis of data collected from the field employed quantitative descriptive methods, including Likert scales for measurement, which made it possible to count systematically, or bi-dimensionally, in a way that is both transparent and conducive to accurately gauging public sentiment. Descriptive statistics, such as mean and distribution, were used to summarize the field survey data in a comprehensive manner. To conduct quantitative analysis, Microsoft Excel and SPSS for statistical calculation were the software used. Descriptive analysis, as aims to set forth the research object using survey or population data exactly as it is, without further analysis or broad generalizations. This entails qualitative components such as data condensation, data presentation, and drawing or affirming conclusions as well as quantitative facets by tabulation analysis. Only by integrating both qualitative and quantitative data can we thus gain a comprehensive understanding of farmers' adoption of the TJPS program, or Juwata Research Centre.

The questionnaire in this study was carefully designed with the primary aim of collecting relevant data from farmers, with particular attention given to female respondents whenever appropriate. This focus on women stems from their critical role in household agricultural decision-making, including choices related to crop selection, food security strategies, and the adoption of agricultural innovations. Capturing their perspectives was therefore considered essential to achieving a comprehensive understanding of the research objectives. To measure participants' responses, the questionnaire employed a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). This approach allowed respondents to express varying degrees of agreement or perception towards specific statements, providing richer insights into attitudes toward agricultural innovation, local traditions, and the effectiveness of agricultural extension services. Before launching the main survey, a pilot test was conducted with 20 farmers from outside the target study area. The pilot aimed to assess the clarity of the questions, their relevance to the research focus, and the internal consistency of the questionnaire. Based on the feedback gathered, revisions were made to refine ambiguous, unclear, or less relevant items, ultimately improving the quality of the final instrument. To ensure the reliability of the questionnaire, Cronbach's Alpha was used, with a threshold of $\alpha \geq 0.70$ considered acceptable for internal consistency. Meanwhile, the validity of the questionnaire was tested using Pearson's correlation analysis to confirm that each item accurately measured the intended construct.

Through this rigorous process of development, testing, and refinement, the questionnaire was validated as a reliable and effective tool for capturing meaningful and trustworthy data. This not only strengthened the transparency of the research methodology but also reinforced the overall credibility of the study's findings.



RESULTS AND DISCUSSION

In 2018, the consumer price of cooking oil was documented at IDR 14,900, although the wholesale price was IDR 13,350 (Figure 1). The pricing was very constant until early 2020, with modest changes that were insignificant. However, at the onset of 2020, prices commenced a more significant escalation. In January 2020, consumer prices attained IDR 15,200, while wholesale prices hit IDR 12,400. The price escalation persisted until the conclusion of 2020, culminating in a consumer price of IDR15,500 and a wholesale price of IDR13,400 in December 2020.

Overview of the implementation of planting corn harvesting cattle program in North Central Timor: Since 2019, the TJPS program's communication strategies in North Central Timor regency have been executed concurrently. These strategies are primarily delivered by local extension officers, who serve as the primary communicators. A diverse array of communication channels is employed, encompassing both interpersonal interactions, such as face-to-face meetings, and the distribution of informational materials like leaflets and brochures. Additionally, various forms of mass media are utilized to promote corn planting programs. The core of the communication efforts focuses on several key messages, including the introduction of innovative practices in Integrated Plant Management, strategies for optimizing the expansion of soybean planting areas through the enhancement of soybean planting indices, and the enlargement of corn planting territories. Furthermore, the program addresses the provision of agricultural support and infrastructure, such as seeds, fertilizers, pesticides, tools, and machinery (Bishaw and Atilaw, 2016; Joshi *et al.*, 2012; Danda, 2022; Lencucha *et al.*, 2020; Reddy, 2022). It also covers critical issues such as the management of Plant Disruptive Organisms, the implications of climate change on agriculture, the importance of agricultural insurance, and the provision of oversight and mentorship for farmers.

The level of community acceptance of the TJPS program innovation in the region of North Central Timor-East Nusa Tenggara can be described in five stages, as follows:

1. The Pioneer or Innovator Group: This group consists of individuals who rapidly adopt the TJPS program innovations. Typically, this group shows a limited interest in the active outreach efforts of extension workers to disseminate the innovation of the TJPS program, relying instead on their knowledge and experience to share information within their community.
2. The Early Adaptor Group: Members of this group quickly respond and accept the TJPS program as presented by extension workers, often engaging with the program on a personal level.
3. Early Adopters or Early Majority: This group is characterized by a slower response to the TJPS program offer. Acceptance usually requires concrete evidence

demonstrating that the TJPS program can enhance their productivity and welfare.

4. Late Majority Group: Individuals in this category are very slow to respond to the TJPS program. However, once they are fully convinced and presented with tangible benefits of the program, they are likely to participate.
5. The Rejection Group: Typically, unaware of the benefits of the TJPS program, this group perceives it as no different from previous initiatives. Consequently, they are quick to decline any offers related to the program.

In the five groups studied, it is evident that individual acceptance of the TJPS program varies. According to Lencucha *et al.* (2020), this variance could be attributed to the effectiveness of extension workers in disseminating information about the TJPS program or influenced by the community's internal dynamics.

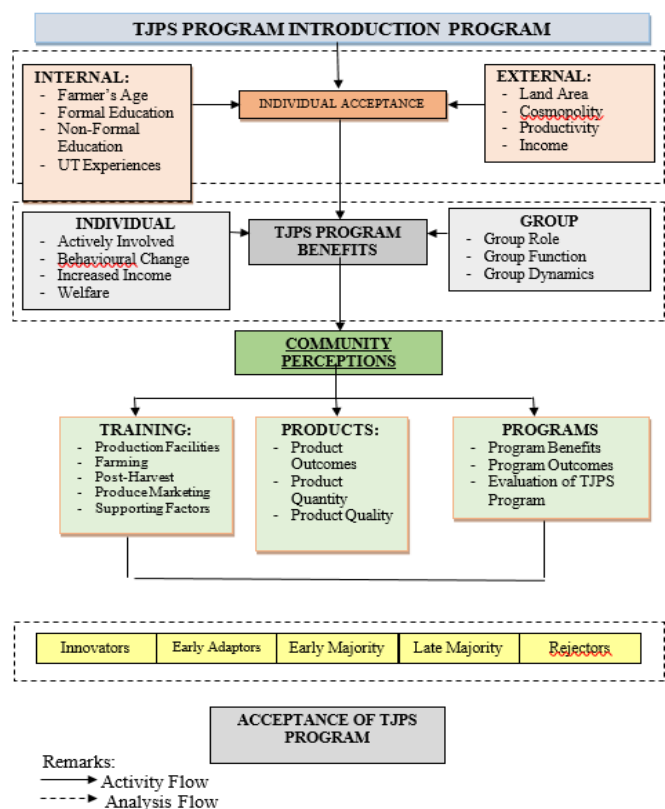


Figure 1. Framework for community acceptance of the planting corn harvesting cattle program (TJPS).

The primary mode of communication among farmers in Insana District, North Central Timor Regency, East Nusa Tenggara, regarding the TJPS program implementation, is predominantly interpersonal. Notably, a minimal percentage (0.05%) of respondents utilize electronic media, such as mobile phones and the internet, for this purpose. Communication predominantly occurs in Dawan—the local language and primary language of daily communication for



all respondents—and Bahasa Indonesia, used by 65% of respondents. During TJPS program activities, Dawan serves as the principal medium of communication among farmers and between farmers and extension workers. Conversely, interactions with program managers across various stages—from land preparation and seed selection to planting, maintenance, pest and disease control, and finally, harvest and post-harvest—are conducted in a mix of Dawan and Indonesian (Bottrell and Schoenly, 2018; Unis *et al.*, 2024). Notably, corn farming practices among respondents in the Insana District are deeply intertwined with local wisdom, particularly the use of rituals or prayers directed at ancestors and the universe. A strong belief pervades among farmers that consistent communication with ancestral spirits and the cosmos ensures successful farming outcomes that meet their expectations. Conversely, the absence of such rituals is believed to precipitate crop failure and disaster.

Based on the above assumptions, schematically, this framework is presented in Figure 1.

The framework illustrates how the community comes to accept the Planting Corn Harvesting Cattle Program (TJPS) by considering both internal factors, such as a farmer's age, education, and experience, and external factors like land size, productivity, and income. Once an individual accepts the program, they gain benefits that improve their involvement, income, and welfare, while groups experience better teamwork and role clarity. These benefits influence community perceptions, which then shape training programs,

product outcomes, and overall program evaluation. As a result, different groups within the community adopt the program at various stages, from innovators and early adopters to the late majority and rejectors, ultimately determining the level of acceptance of the TJPS program as a whole. The diagram uses activity and analysis flows to show how training, evaluation, and production processes contribute to the success of the program within the community.

The existence of the TJPS program in Insana District, North Central Timor Regency, which does not consider local wisdom, is believed to have not increased the production achieved by corn farmers in Insana District, North Central Timor Regency, East Nusa Tenggara. The development of corn production is presented in Table 1.

The data in Table 1 paints a clear picture of the gap between national and regional corn production targets in East Nusa Tenggara (NTT) Province and NCT Regency. While the national productivity steadily improved, reaching 54.80 ku/ha in 2019, NTT and NCT remained significantly lower, with NCT starting at just 20.01 ku/ha in 2015 and only reaching 28.70 ku/ha by 2019. Despite some gradual progress, the overall productivity and harvested area in these regions still fall short of national targets. This suggests that the TJPS program has yet to fully implement advanced corn farming technology, leaving room for improvement in farming methods, resource allocation, and support systems. Without stronger interventions and better adoption of modern agricultural techniques, the productivity gap is likely to

Table 1. Targets for planted area, harvested area, productivity and corn production in 2015-2019 at the national and east Nusa Tenggara provincial levels.

No	Targets	Planted area (Ha)	Harvested area (Ha)	Productivity (ku/ha)	Production (Tons)
1	2015				
	National	4.244.976	4.019.360	50.54	20.313.731
	Province	273.694	259.148	28.08	727.790
	NCT Dist.	13.182	13.182	20.01	26.462
2	2016				
	National	4.372.365	4.153.747	51.41	21.353.794
	Province	281.905	267.810	28.57	765.053
	NCT Dist.	13.813	13.813	21.47	29.665
3	2017				
	National	4.470.435	4.246.914	52.65	22.360.000
	Province	288.228	273.816	29.26	801.103
	NCT Dist.	7.445	7.445	25.33	18.863
4	2018				
	National	4.599.208	4.369.248	53.75	23.484.708
	Province	296.530	281.704	29.87	841.398
	NCT Dist.	21.401	21.401	27.78	59.465
5	2019				
	National	4.744.526	4.507.299	54.80	24.700.000
	Province	305.900	290.605	30.45	884.939
	NCT Dist.	22.134	21.718	28.70	62.348

Source: Directorate General of Food Crops, 2020



persist, limiting the region's ability to meet national production goals.

An overview of internal and external factors for farmers adoption rate of planting corn harvesting cattle (TJPS) in North Central Timor Regency

Farmers' internal factors: Farmers' internal factors for TJPS can be illustrated in specific characteristics inherent to farmers. Indicators of internal factors for TJPS farmers were defined in the form of categorization to facilitate descriptive analysis. Farmers' internal factors measured in this study composed of: age, formal education, non-formal education, farming experience, area of cultivated land, cosmopolitan. Table 2 illustrates respondents proportion based on distributed farmers' internal factors for TJPS in Insana District.

The data (Table 2) gives a clear picture of the farmers' background and the challenges they might face in adopting new agricultural practices. Most farmers are in their productive years, with more than half aged 42-55 years, and an average age of around 50. Their farming experience is strong, with nearly three-quarters having worked in agriculture for over 16 years, which shows deep-rooted knowledge of traditional farming methods. However, education remains a major challenge—while most farmers have some formal schooling, 64% only completed between 4-7 years of education, and very few pursued higher levels. The most concerning factor is their lack of access to non-formal education, such as training programs, with 94% receiving little to no additional learning opportunities. This suggests

that while farmers have experience, their limited exposure to modern techniques and innovations could slow down the adoption of improved farming practices, highlighting the need for better training and knowledge-sharing initiatives.

Farmers' age: Age in this study refers to the total number of years from a respondent's birth to the application of this study. The farmer respondents in the research location were identified as being in their productive phase, with an average age of 49.77 years. This classification indicates that, in terms of health and working capacity under the Special Efforts program for corn planting, they possess a higher activity capability compared to their less productive counterparts. The Central Bureau of Statistics (BPS, 2021) defines the productive working age range as between 15-64 years. Pertaining to the acceptance of TJPS program innovations, it was observed that productive farmers are likely to engage more actively in communication, especially in seeking vital information related to the farming process, including corn planting, maintenance, and harvesting. This observation aligns with the findings of Aubert *et al.* (2012); Matouš *et al.* (2012); Nmadu *et al.* (2015); Awotide *et al.* (2016); Serebrennikov *et al.* (2020); Vecchio *et al.* (2020); Arhin *et al.* (2024), which suggest that the acceptance rate of farmers in their productive age towards innovation adoption processes is more receptive compared to older farmers. Generally, older age is associated with a decline in physical condition, slower decision-making processes, and a more thoughtful and considerate demeanor. Consequently, it can be concluded that the productive age of farmers significantly correlates with the

Table 2. Proportion of TJPS farmers based on farmers' internal factors in 2021.

Farmers' internal factors (1)	Category (2)	N (Person) (3)	Percentage (%) (4)	Average (5)
Age (Year)	Youth (< 42 years old)	32	20	49.77
	Adult (42-55)	87	54	
	Elderly (> 55 years old)	42	26	
Total		161	100	
Formal Education	Extremely low (< 4 years)	19	12	6.41
	Low (4-7 years)	103	64	
	High (8-11 years)	27	17	
	Extremely high (> 11 years)	12	7	
Total		161	100	
Non-formal Education	Extremely low (< 2 times)	152	94	0.65
	Low (2-3 times)	9	6	
	High (4-5 times)	-	-	
	Extremely high (> 5 times)	-	-	
Total		161	100	
Farming Experience	Extremely low (< 9 years)	20	12	17.72
	Low (9-15 years)	24	15	
	High (16-22 years)	77	48	
	Extremely high (> 22 years)	40	25	
Total		161	100	

Source: Primary Data, 2021



effectiveness of communication acceptance for the TJPS program in the North Central Timor Regency, Nusa Tenggara Timur.

Formal education: Formal education level of informants in this study was categorized into several levels. Lower education level ranges from not receiving any education up to going to school only until the 6th grade of Elementary School or Public School, meanwhile, high education level reaches university including Bachelor's degree. Results of this study suggested that the highest formal education level is within lower condition with 6 years in average (77.8%). The lower education level in the research location is because majority of the respondents were struggling financially to pay education fees, and poor awareness and lack of parents' role in the old days to send their children to school to higher education level. Most of the respondents claimed that they prefer to not continue their education, but work at a very young age so as to support family's economy. According to the results of a study by [Adawiyah \(2017\)](#), education level is able to determine the capability of a person in absorbing information provided with respect to working quality in farming activity, well-educated female farmers are more able to cultivate cacao leading to agribusiness, not only for the fulfillment of family needs. Social studies on society conducted by [Adegboye \(2016\)](#) and [Falo and Nubatonis \(2017\)](#), suggested that education level is one of three social economic components which can affect an individual participation rate in each stage of farmer groups' activities. Those components are composed of work, education, and income. In other words, there is a positive relation between education level of a person and TJPS program in North Central Timor Regency.

Non-formal education: The study revealed that the non-formal education received by corn farmers participating in the TJPS program was relatively limited, with 66.7% of them receiving such education no more than five times over the past three years. This indicates that the level of non-formal education among respondent farmers in the Insana District is considered low. The types of training attended included comprehensive corn cultivation practices, ranging from seed selection and preparation for planting to pest and disease control, as well as harvesting and post-harvest techniques. These training sessions were conducted by the Agriculture and Plants Service Office in North Central Timor Regency. [Witteveen et al. \(2017\)](#), [Fauzi \(2019\)](#) and [Intsiful and Martins \(2019\)](#) highlighted the positive and significant impact of non-formal education on enhancing cacao farmers' skills and cacao production. Given the scarcity of formal educational opportunities, the development of non-formal educational avenues, such as courses for farmer groups, extension services, demonstration plots, comparative studies, and field meetings, is imperative. These initiatives are instrumental in enriching farmers' knowledge, building their experience in farm management, and fostering knowledge transfer within the farming community. The study also found that

respondents who attended more than four training sessions typically held positions of leadership or influence, such as organizers of farmer groups, village officers, and advanced farmers. This pattern underscores the current shortfall in non-formal educational engagement within the study area. Consequently, it is essential for farmers with substantial non-formal education to disseminate the knowledge acquired to their peers, thereby facilitating the expansion and enhancement of agricultural practices from one farmer to another.

Farming experience: Farming experience is a duration (years) of work in corn farming activities. Farming experiences is more likely to affect decision to be made for the next farming activity. Farmers with more years of farming experience will be easier to implement innovations than new farmers, as a result of more experience so they are able to make a comparison in making any decision. Results of the study regarding corn farming experiences of farmer groups informant in Insana District, they are mostly in elderly category of corn farming with the interval of 15-25 years (88.8%). This also showed that Farmer Groups in Insana district already have corn farming experiences. [Swofford and Slaterry \(2010\)](#) and [Belay et al. \(2017\)](#) stated that one's experience would affect decision making process, consequently farmers with longer farming experience are more likely to be selective in communication process of decision making compared to farmers with less experience.

External factors: External factors of TJPS farmers observed in this study include: (1) area of cultivated land, (2) cosmopolitan, (3) productivity, (4) Acceptance. Further description is as shown in Table 3.

The data reveals key external factors affecting TJPS farmers in 2021. Most farmers (56%) cultivate extremely narrow land areas of less than 0.65 hectares, with an average of 0.33 hectares, indicating significant land constraints. Their cosmopolitan exposure (interaction with external influences) is also low, with 63% engaging with outside communities less than three times a month, limiting access to new agricultural knowledge and innovation. Productivity remains a major issue, as 78% of farmers produce only between 1-1.9 tons per hectare, with an average yield of 1.09 tons/ha, far below optimal levels. In terms of financial acceptance (income from farming), 60% earn between 2-4 million IDR, suggesting that most farmers operate on low-profit margins. Overall, these findings highlight serious limitations in land access, information exchange, productivity, and financial gains, emphasizing the need for interventions to improve land management, knowledge sharing, and yield-enhancing techniques.

Area of cultivated land: Area of the cultivated land as referred to in this study is the area of corn land the informants owned to be used for corn cultivation under TJPS program to increase production whether it is their own, rented, profit sharing, shifting production. The area of the cultivated land



Table 3. Proportion of TJPS Farmers Based on Farmers' External Factors in 2021.

Farmers' External factors	Category	N (Person)	Percentage (%)	Average
(1)	(2)	(3)	(4)	(5)
Area of cultivated land	Extremely narrow (< 0.65 ha)	90	56	0.33
	Narrow (0.65 ha – 1.09 ha)	52	32	
	Wide (1.10 ha – 1.54 ha)	11	7	
	Extremely Wide (> 1.54 ha)	8	5	
Total		161	100	
Cosmopolitan	Extremely low (< 3 times/month)	102	63	2.33
	Low (3 – 4 times/month)	51	32	
	High (5-6 times/month)	5	3	
	Extremely high (> 6 times/month)	3	2	
Total		161	100	
Productivity (ton/ha)	Extremely low (< 1 ton/ha)	36	22	1.09
	Low (1 – 1,9 ton/ha)	125	78	
	High (2- 2.9)	-	-	
	Extremely high (>2.9)	-	-	
Total		161	100	
Acceptance	Extremely low (< 2 Millions)	41	25	2.4
	Low (2 – 4 Millions)	96	60	
	High (4.1- 6 Millions)	18	11	
	Extremely high (> 6 Millions)	6	4	
Total		161	100	

Source: Primary Data, 2021

affects the attitude in cultivating the land. According to Swofford and Slattery (2010) and Belay *et al.* (2017) F-count value of 2.694 and t-count of 0.203 and t-table of 7.574 with 5% significance level, means that experience has a real effect on the adoption of technological innovation by rice farmers. Farmers managing an extensive land would obtain great production and vice versa. Based on the results of this study, it suggested that the estimated land area of respondents ranges from 0.25 hectares to 2 hectares. The greatest percentage was in narrow category the area of which only ranges between 0.25 hectares to 1 hectare (88.8%). Farmers owning or managing land less than 0.5 hectare are considered as gurem (small) farmers. Land ownership in average below 0.5 hectare and without support of land management which enables business scale achievement, will make farming becoming economically less interesting as it could not provide any security as an income source which is able to deliver better life.

Cosmopolitan: In-depth interviews with respondent farmers revealed that the cosmopolitanism among farmers is markedly low, with 66.7% reporting minimal or no travel outside their villages to seek information on production facilities, markets, other business opportunities, or farming technologies. This indicates a reliance on local sources for information, primarily through group organizers, instructors, and village supervisory non-commissioned officers (Babinsa). Despite this local focus, farmers are relatively open to external information, driven by a desire to enhance plant production and income.

Farmers exhibiting higher cosmopolitanism tend to hold positions such as heads or managers of farming groups, possess traditional authority, or work as breeders or traders. This higher level of cosmopolitanism among certain farmers suggests a proactive approach in seeking market and technology information to advance their agricultural practices. According to Hasniati (2019), the study suggests that (1) cosmopolitan farmers are categorized as higher, (2) the management of wet rice is classified as moderate, and (3) cosmopolitan farmers demonstrate a purposeful association with the management of wet rice farming in terms of communicating with instructors, reading agricultural bulletins or magazines, and engaging with broadcast media. In the research locale, farmers' preference for information from instructors over other sources underscores the trust placed in these figures. This trust, coupled with the considerable time and expense associated with seeking information, leads farmers to focus more intently on practical farming applications.

Corn productivity: Farmers' productivity under the TJPS program reveals that corn farming productivity within the Fatusene Farmers Group averages 2.9 tons/ha, while the national target for corn productivity stands at 5.04 tons/ha. This discrepancy highlights a significant gap between local and national productivity levels. The advantage of high productivity lies in achieving comparable production rates at reduced costs. Research indicates that corn farming productivity among TJPS farmers in the Insana District of the



North Central Timor (NCT) Regency predominantly falls into the lower category (78 percent), with an average productivity score of 1.09 tons/ha. This reduced productivity level stems from several factors, including incomplete implementation of corn plant innovations, inadequate land management due to a scarcity of farm workers, and reliance on traditional farming methods. To address these challenges, it is imperative to enhance the role of various stakeholders, including extension workers, in transforming farmers' perspectives through on-site training. Such initiatives should aim to replace outdated practices with innovative systems. This approach aligns with the findings of Nugraha *et al.* (2024) who identified underutilization of superior seed varieties, fertilizers, and pesticides, coupled with a labor shortage, as key factors impacting the productivity of Arjuna corn.

Furthermore, our study suggests that enhancing corn farming productivity necessitates a holistic approach encompassing the integration of local wisdom (pertaining to ancestors, nature, and divinity) and advancements in agricultural techniques. This includes adopting hybrid and composite corn varieties, optimizing planting schedules based on agroecological conditions, and expanding cultivation areas (Nyagumbo *et al.*, 2017; Bahtiar *et al.*, 2023; Nugraha *et al.*, 2024). To remain competitive in both domestic and international markets, it is crucial to focus on improving farming efficiency and productivity alongside the quality of produce. Such improvements can be achieved through the adoption of local resource-based technological innovations, encompassing modified plantation techniques, environmental manipulation, and tailored planting systems, fully grounded in local wisdom to optimize agricultural output (Gianni *et al.*, 2017; Muralikrishnan *et al.*, 2022).

Corn farming income: Corn farming income was calculated based on revenue of the respondent farmers including as calculated from corn farming outcome during planting season of 2020/2021. The corn farming income of farmers group members in Insana District, North Central Timor was Rp2,847,222/year in average meaning that majority of the respondent farmers was under lower category (60%). This shows that despite obtaining supports including fertilizer, seeds, pesticide, and agricultural tools and machinery, farmers only earned such income (Lai, 2008; Altieri *et al.*, 2012; Johansen *et al.*, 2012; Teklewold *et al.*, 2013). In connection with that case, to fulfill daily essential needs, farmers can carry out farming activities in other sectors including as breeders, construction workers, taxibike drivers, public transport drivers, even as Indonesian Migrant Worker (TKI) in Malaysia. The income rate earned could describe farmers' capability in providing any farming requirements from financial aspect, farmers group could be assisted socially in most of production facilities cooperatively provided by government and group members, farmers may be only responsible for consumption for utilization of labor required (Bacon *et al.*, 2012; Baldassarri, 2015; Chagwiza *et al.*, 2016).

In relation to that case, communication activity in extension activity is crucial to be carried out continuously without limitation to physical activity only, but also with respect to financial management which can assist to suppress the needs so that farmers would not feel content with their current lives.

Farmers adoption of planting corn harvesting cattle (TJPS) program in North Central Timor: Society members in a social system could be classified into adopter categories (innovation recipient). This is consistent with innovation level (acceleration in accepting innovations). One of the categories that can be made as a reference is a category based on adoption curve, which had been tested by Rogers (1983).



Figure 2. Adopter group under social system (Rogers, 1983).

Acceptance rate of the Society for TJPS Program, which is Corn program, was implemented by NTT Province through NCT Regency, the results of evaluation for the last 3 years in several areas suggested that there was a lack of farmer community attention. Society's perception toward TJPS program is one of the important factors of the continuity of such TJPS program. This study aimed to analyze the acceptance rate of farmers and factors affecting farmers' acceptance rate of TJPS program in North Central Timor Regency-Nusa Tenggara Timur, whether as a new innovation or as an entity providing services.

Study results suggested that the acceptance rate of the society for TJPS program in North Central Timor Regency was under good category, meaning that the society sufficiently accepted TJPS program within their environment but yet optimally in its utilization, as shown in Table 4.

In Table 4, we observe a comparative analysis of societal acceptance rates derived from Rogers' (1983) classification against the acceptance rate among corn farmers for the TJPS program in North Central Timor Regency, Nusa Tenggara Timur Province. Notably, the acceptance curve outlined by Rogers (1983) differs in shape compared to the curve representing society's acceptance rate for the TJPS program within the same region.



Table 4. Percentage of acceptance classification comparison between study results of Rogers (1983) and acceptance of society for TJPS program in NCT Regency-NTT (%).

Acceptance rate	Classification percentage of rogers (1983)	Acceptance classification percentage of TJPS
1. Innovators	2.50	6.30
2. Early adopters	13.50	15.20
3. Early majority	34.00	39.20
4. Late majority	34.00	28.20
5. Laggards	16.00	11.10
Total	100	100%

Source: Primary data, 2019 (processed)

These differences, when applied to the context of rice in Rogers' classification versus the TJPS program, are elucidated as follows:

1. Innovators: Rogers identified this group as comprising 2.5% of the population, whereas in our study, the acceptance rate for the TJPS program among farmers was 6.3%. This significant increase suggests a paradigm shift, potentially attributable to corn farmers recognizing the program's potential to enhance their income. Notably, this group primarily relied on online media for information, bypassing traditional face-to-face extensions.
2. Early Majority: Rogers' model posits this segment at 34%, while our findings indicate a higher acceptance rate of 39.2% for the TJPS program. This increase affirms the corn farmers' endorsement of the program, driven by tangible evidence of its success and a proactive approach to sourcing information from various channels, including extension workers and peers within the program.
3. Late Majority: According to Rogers, this group also represents 34% of the population. However, our study found a lower acceptance rate of 28.2% for the TJPS program among corn farmers. This discrepancy suggests that a significant portion of this group, prior to accepting the program, seeks concrete evidence of its efficacy. Despite challenges related to personal and economic constraints, the visibility of the program's benefits has spurred interest among these traditionally slow adopters.
4. Laggards: Rogers' classification earmarks 16% of the population for this group, characterized by their resistance to adoption despite awareness of the innovation. In contrast, our study observed a lower rejection rate of 11% for the TJPS program, indicating a shift in the curve towards reduced societal rejection.

These findings highlight the nuanced dynamics of technology adoption among corn farmers in North Central Timor Regency, suggesting that the TJPS program's perceived benefits have influenced a broader acceptance beyond traditional expectations based on Rogers' classification.

The results of curve comparison of Rogers' classification with the results of farmers' acceptance for TJPS program in North Central Timor Regency-Nusa Tenggara Timur are as shown in Figure 3.

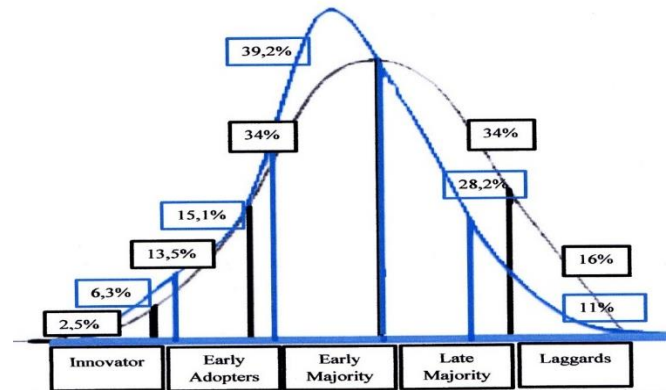


Figure 3. Comparison of chart of Rogers' classification and society acceptance rate for TJPS program in North Central Timor Regency.

In Figure 3, we compare the classification models according to Rogers with the acceptance rate of the TJPS program in the North Central Timor regency of Nusa Tenggara Timur. This comparison reveals a deviation between Rogers' classification and the outcomes observed in this study. Such deviation is linked to the primary reasons farmers accept the TJPS program, including age, formal education, availability of information, and dependency factors. Our findings suggest that younger farmers exhibit higher acceptance rates, which correlates with their access to information about the TJPS program. Additionally, farmers with fewer dependents tend to participate more actively in the program. The curve depicting farmers' acceptance of the TJPS program does not follow a perfect curve, unlike the normal distribution observed in Rogers' classification. This discrepancy underscores the need for further investigation into the determinants that could align the acceptance curve with Rogers' classification in various programs.

DISCUSSION

Communication channels and extension strategies: The TJPS program, implemented in 2019, serves as a strategic government initiative aimed at improving food security and increasing farmers' incomes through a combination of agricultural practices and livestock farming. In practice, the communication strategy of the TJPS program relies heavily on agricultural extension agents who act as the primary link between the government and farmers. These agents are responsible for conveying information using a variety of methods, including field demonstrations, group meetings with farmers, and the distribution of printed and digital materials. The core messages of the program emphasize the advantages



of integrating maize cultivation with cattle raising to promote a sustainable agricultural model that enhances productivity and resilience. Interpersonal communication remains the dominant form of information exchange among farmers in Timor Tengah Utara. Farmers predominantly rely on face-to-face discussions, farmer group meetings, and community events to gather information about agricultural innovations and the TJPS program. This mode of communication is deeply rooted in the cultural and social fabric of the rural communities, where trust and personal relationships are critical to the acceptance of new ideas.

The use of electronic media such as television, radio, and internet platforms is still minimal among farmers. Limited access to technology, low digital literacy, and infrastructure constraints such as poor internet connectivity further hinder the utilization of electronic communication channels. Consequently, interpersonal and community-based approaches continue to be the most effective methods for reaching farmers with program information. Agricultural extension agents play a crucial role in facilitating this communication process. Their responsibilities include not only providing technical information but also building trust, motivating farmers, and addressing cultural barriers that may prevent the adoption of new practices. By demonstrating successful maize-cattle integration through field practices and regular meetings, extension workers create environments where farmers can see real-world applications and outcomes of the innovations being promoted. The TJPS communication strategy is designed to move farmers progressively through different stages of innovation adoption. Starting with building awareness, followed by stimulating interest, encouraging small-scale trials, and finally achieving full acceptance, this approach seeks to gradually reduce farmers' uncertainty and resistance to change. Extension activities, when conducted consistently and contextually, help farmers internalize the benefits of adopting new agricultural methods. Despite these efforts, communication challenges persist. Language barriers, variations in literacy levels, and differences in cultural backgrounds between extension workers and farmers can impede the effective transmission of information. For instance, while Indonesian is the formal language for official communication, many farmers prefer local languages such as Dawan for everyday interactions, necessitating bilingual communication efforts. To overcome these challenges, extension workers often utilize simplified language, visual demonstrations, and participatory teaching methods. By adapting communication techniques to suit local needs and cultural contexts, the TJPS program has been able to foster stronger engagement and greater receptivity among the farming communities. Overall, the combination of direct interpersonal communication, strategic use of extension agents, and gradual familiarization with innovations has proven to be a critical factor in facilitating the adoption of sustainable agricultural practices under the TJPS program.

Moving forward, strengthening the capacity of extension services and expanding access to supportive communication technologies will be key to enhancing the reach and impact of the program. In the context of the TJPS program, farmers in Timor Tengah Utara have different levels of acceptance. This variance is associated with economic factors, the efficacy of agricultural extension, and powerful local cultural values, such as agricultural rituals. Research in other regions with similar farmer programs has shown that the effectiveness of extension communication in spreading agricultural innovations is crucial for accelerating their adoption (Aker, 2011; Norton and Alwang, 2020; Steinke *et al.*, 2020; Mapiye *et al.*, 2021; Maulu *et al.*, 2021).

Internal factors: Age, level of education, farming experience, and openness to new information are the main internal factors that affect the farmers' opinions on TJPS. The majority of farmers in Timor Tengah Utara, average age 49.77 years, have the capacity to adapt to new technology, although younger farmers are more inclined to embrace innovation. The generally low level of education (6 years of school on average) presents difficulties in disseminating the technical content of the program. Limited opportunities for non-formal education and agricultural training mean that many people in Timor Tengah Utara do not grasp the basic point, which is sometimes crucial: "maize-cattle integration" (Hasnudi and Lubis, 2014). With more farming experience, these farmers are less likely to accept new innovations, thinking back on proven ways from the past while making decisions. Previous studies also show that experienced farmers hold more skepticism toward fresh ideas than newcomers because nothing can replace empirical evidence (Okekeezodike, 2015; Petersen-Rockney, 2022; Nalle *et al.*, 2022).

External factors also influence the success of the TJPS program. Most farmers in Timor Tengah Utara have relatively small holding sizes (<1 ha), making it hard for them to meaningfully increase maize planting areas. A shortage of farmland restricts farmers from adopting integrated farming systems since these need larger production volumes (Purwono, 2010). With local extension workers as their main information sources, the program's success depends greatly on extending services beyond local boundaries. Maize productivity still lags behind the national target, suggesting that technology-related agriculture introduced through TJPS hasn't reached full optimization. The main reasons for low productivity include limited access to modern agricultural technology and low incomes, limiting investment in machinery (Dorward, 2013; Peng *et al.*, 2022; Rada and Fuglie, 2018; Rogers, 1983), a systematic diffusion model, the innovation adoption pattern in the TJSP program throws up interesting data. More innovation was rapidly adopted by participants in the program than in Rogers' standard model, indicating that they were greatly involved from the beginning. There are more early adopters than in the standard model, with more and more farmers accepting new technology. The



number of late majority adopters and laggards is much less, which indicates that in general this program, despite some troubles, had relatively good reception. Factors influencing these differences are age, education, membership in farmer groups, validity for agricultural extension (Vardhanan, 2023; Aydogdu *et al.*, 2015; Jack *et al.*, 2020). In addition to technical and socio-economic factors, local wisdom is also a decisive factor in the success of the TJPS program. In Timor Tengah Utara, agricultural rituals and beliefs in ancestral spirits affect farming practices and the adoption of new technology. Some farmers choose traditional methods as they think that those are also formed in nature and produce better results. The lack of integration of local cultural values in the program design is one of the reasons why it cannot be fully accepted by farmers. Ethnographic studies have shown that innovation programs that include cultural elements tend to be more successful than those which do not take them into account (Brisset *et al.*, 2013; Dixon-Woods *et al.*, 2014; Leslie *et al.*, 2014; Sharp *et al.*, 2016; Greenhalgh *et al.*, 2019).

Technological adoption patterns and cultural influences:

The TJPS program has shown encouraging signs of technology adoption among farmers in Timor Tengah Utara. Many farmers, particularly those categorized as the "early majority," were willing to adopt new agricultural practices after seeing clear evidence of success in the field. Demonstration plots, testimonials from fellow farmers, and visible improvements in yields proved to be powerful tools in convincing farmers that these innovations were worth embracing. Interestingly, the adoption curve in the TJPS program moved faster than what is typically expected in innovation diffusion patterns. There were noticeably fewer farmers who could be classified as "late majority" or "laggards." This suggests that proactive communication by extension workers, combined with strong community engagement, helped reduce hesitation and built early momentum for change among the farming communities. Yet, despite these successes, cultural factors continue to play a major role in shaping farmers' behaviour. Many farmers hold on strongly to traditional agricultural rituals, ancestral beliefs, and long-standing farming practices that they consider natural and spiritually guided. For these farmers, traditional methods are not merely habits; they are deeply connected to their identity and worldview, making it harder for them to immediately accept external innovations that do not align with their cultural values. One key shortfall of the TJPS program has been its lack of explicit incorporation of local cultural traditions into its design and communication efforts. In Timor Tengah Utara, ceremonies before planting and harvesting are not optional; they are considered essential to ensure success and harmony with nature. Overlooking these practices can unintentionally create a barrier between program promoters and the communities they seek to serve. To strengthen future efforts, it is important to recognize and

respect these traditions by involving cultural leaders and integrating local rituals into extension activities. When farmers see that innovation respects their way of life, they are far more likely to trust and adopt new practices. Respecting culture is not a barrier to innovation — it is a bridge that connects new ideas to existing ways of life. Another important cultural dimension is the communal way farmers make decisions. Farming communities often deliberate and decide collectively, not individually. This means extension strategies need to target groups and community leaders rather than focusing only on individual farmers. Programs that align with these social dynamics tend to spread more smoothly and gain wider acceptance. Finally, beyond cultural considerations, practical economic barriers also need attention. Even when farmers are willing to innovate, lack of financial resources often prevents them from taking action. Offering microloans, starter kits, or subsidies for adopting integrated farming practices could significantly accelerate the transition toward modern and sustainable agriculture. In short, the TJPS experience shows that successful agricultural innovation is about more than just technology or communication. It is about understanding people — their culture, their economy, their collective decisions — and meeting them where they are. Only by respecting these realities can innovation truly take root and thrive in rural communities. Although the production of maize in Timor Tengah Utara has improved compared to past years, it still hasn't received high marks. Maize production data for the truly hearty period (every five years) of 2015 to 2019 clearly shows a rising trend, showing that there is cultivation but the gap between actual yields and government targets is still substantial. Among the difficulties faced by this program, some point out limited access to up-to-date agricultural technology, not enough money for small farmers, and no way of improving extension skills (Chowdhury *et al.*, 2013; Labarthe and Laurent, 2013; Tata and Mcnamara, 2017). Another study also suggests that the smooth implementation of large-scale agricultural programs heavily depends on sufficient infrastructure support and access to markets (Abate *et al.*, 2023).

In essence, whether or not farmers are willing to adopt the TJPS program in Timor Tengah Utara is influenced by a combination of internal and external factors: age, education, farming experience, land size, access to information, and economic conditions. The innovation adoption pattern in this program is somewhat different from that of the standard model; there are more early adopters and innovators than in Rogers' original. Cultural factors also play a critical role in program success or failure, showing that a more locally tailored approach is necessary to make things go more smoothly. To enhance the effectiveness of this program, agricultural extension work needs to integrate local cultural values into its communication strategies so that they are better aligned with farmers' minds and actions. In addition,



improving access to non-formal training and strengthening infrastructure support are necessary for speeding up the adoption of technical innovation and raising productivity in maize in this region (Nuraeni *et al.*, 2013; Ketut *et al.*, 2020; Falo Marsianus, 2023; Haryanto *et al.*, 2023; Levis *et al.*, 2023; Dewijanti *et al.*, 2024).

Conclusion: This paper looks at the communication processes used in farming, gathering, threshing, and apprentice schooling of maize. This research found that for all farmers, interpersonal situational style remains vital in distributing low yield information and conducting selected responsible activities germane to the TJPS Programme of an Advisory Secretariat. Only a tiny proportion of farmers these days (0.05%) use electronic media such as mobile phones and the internet to learn about agricultural techniques. This is indicative more than anything else that the adoption of information technology for agriculture is such an obstacle to farmers in this area. Simultaneously, language is a very important factor in information proliferation—all the farmers in this study used the local language meaning 'Dawan' as their daily communication tool, while 65% of respondents also employ Indonesian to differing extents. This means basically that interfacing with the outside world or bringing in information of a formal standard is carried out simultaneously through both languages. Apart from communication, the study also identifies a range of internal and external factors that affect farmers' willingness to participate in or recognize the TJPS programme. Moreover, internal factors in turn have a superimposed effect upon external variables. Both positively affect the development of the programme. All except only one of these factors (age) are highly significant internal variables for a farmer's potential readiness and adaptability to take on agricultural innovations from the new TJPS programme.

Nonetheless, for all that internal variables exert a positive influence, productivity and recognition of the TJPS programme on the part of farmers both remain at low levels. This means that in addition to internal factors, external factors such as government policy, the availability of agricultural infrastructure, and the effectiveness of agricultural extension services may also affect success in implementing it. From the perspective of technological adoption, the findings showed that most of the peasants participating in the TJPS program are 'early majority' (39.2 percent). This means farmers generally are willing to receive agricultural technical innovations, but only further research has proven this on the ground. In other words, farmers of the first kind won't adopt a new idea the minute it comes out but prefer waiting and seeing how other farmers experience those technologies. This also means that the success of the TJPS program depends largely on how these new ideas are introduced and shown to be practical in practice. Moreover, farmers actively seek information from a range of sources, and not just wait for the

agricultural extension workers. Rather, lastly, incoming now goes to other farmers, who have already the TJPS program themselves. Farmers' 'trust' experience will play a big role in their decision-making processes of technological adoption.

In summary, this study points out that 'informal communication' is still the primary method used by farmers to disseminate information; electronic media is hardly ever used. Although the level of participation by farmers in the TJPS program differs significantly according to internal factors, their degree of acceptance is also still quite low. In technological adoption terms, the farmers in Insana District generally belong to the 'early majority'. In other words, the key here is to increase the production efficiency but occasionally get feedback from fellow farmers about it. Therefore, as the study concludes, a more accommodating communication strategy, greater external support, and firmer proof that the TJPS program 'works' are all necessary if farmers' output is to be increased.

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Policy referred: Planting Corn, Harvesting Cattle" (TJPS) Program; Agricultural policy initiative; corn planting areas, yields, and productivity.

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